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Development of Banana-soy Sesame Based Weaning Food for Malnourished Children

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Abstract

Optimal incorporation of soybean and sesame in banana flour was done to develop weaning food with respect to sensory quality and nutritional density. The flour was prepared using conventional dehydration process, subsequent to which a mixture design involving incorporation of soybean and sesame into banana flour was used. Products were evaluated for composition and functional properties, as fat content, moisture content and ash content. The result indicated that a ratio of 67:16.5:16.5 percent banana flour, soybean, sesame flour respectively was optimal incorporation. Sensory analysis and proximate analysis revealed that incorporating soybean and sesame into the banana flour significantly improved all sensory characteristics and hence the nutritional quality. The optimal value of fat content was 8.96%, moisture content 4.83 % and ash content was 2.05%. All levels had fallen below allowable recommended range. Though the moisture increased marginally compared to change in storage period.

Study on the shelf life of the product was revealed that HDPE is a best barrier of moisture, air & microbes than LDPE because the significant decreasing in fat content and ash content and significant increase in moisture content was lesser in HDPE than LDPE due to the density difference in those two packaging materials was as follows: LDPE (910- 940 kg./m^3) and HDPE (941 – 965 kg. / $m^{3)}$ having low permeability to gas and moisture.

Keywords: Malnutrition, Soya flour, banana flour, sesame flour, weaning food.

1. Introduction

India leads in the greatest population of severely malnourished children in the world. Four hundred million children suffer daily, which is a greater problem than in Sub-Saharan Africa. Childhood malnutrition is a massive crisis caused by a combination of factors including inadequate or inappropriate food intake, childhood diseases, harmful childcare practices, and improper care during illness: all contributing to poor health and millions of deaths annually. A deficiency in the amount of food leaves millions starving, many of whom are children, unable to change their situation. According to the National Family Health Survey of India, 48% of children in India are malnourished. 55% of children living in rural areas suffer from malnutrition compared to 45% of children in urban areas. The situation is particularly grave in states like Bihar, Uttar Pradesh, Madhya Pradesh and Rajasthan. According to the Indian Council of Media Research, there is a great lack of nutrition with many leaving out the most crucial nutrients from their diet. (Blakeman, 2005)

A mixture of 67% banana, 16.5% soybean and 16.5% sesame flours produced a blend whose proximate analysis, PER and sensory evaluation studies had satisfactory nutritional quality, quantity and optimum organoleptic attributes. There was a high nutritional quality attained when soy and sesame flours were mixed in equal proportions. Therefore optimum incorporation of soybean and sesame in banana based complementary diets not only greatly enhances nutrient density and quality of these diets. Feeding children these diets could break the cycle of childhood malnutrition through reduced feeding of starchy gruels that have low energy and protein contents or with undesirable sensory properties. The mixture is also easy to prepare at community level and may be adequate for catch up growth among children recovering from malnutrition (Devi et al.1980).

There is no clear definition of weaning food but in general they include all staple food that are the first food added to the diet of infants. At higher moisture the product turns bitter owing to hydrolytic rancidity. They are mostly available in bag-in-box type packaging where LDPE is used as the sealant layer. The other films used for liner bags are BOPP/Poly or Polyester/Poly. Some baby foods are available in lined cartons. (S Makhal et al. 2003). Weaning food is an essential diet of growing infants. They are used to change the diet pattern of infants from liquid food like breast milk and substituted milk proportions to cooked solid food. They can be used as and when desired with minimum of processing and with desirable sensory quality and shelf-life. Infants are usually weaned between 4 and 6 months as baby's feeding behaviour progresses from sucking to biting and chewing. The objectives of this study were **1)** To develop weaning food by banana flour, soy, sesame **2)** To evaluate the physico-chemical characteristics of final product in different packaging materials during storage

2. Materials and Methods

The experiment was carried out in the research laboratory, Department of Food processing, Vaugh School of Agriculture Engineering and Technology, Sam Higginbottom Institute of Agriculture Technology and Sciences (AAI-Deemed University)

2.1 Procurement of raw material:

Fresh unripe banana was purchased from the local market of Allahabad. Soybean seed, sesame seeds were purchased from the local market of Allahabad.

Table 1: Formulation of Product combinations:

Sample	%banana	%soybean	%sesame
Banana- soy flour (A)	67	33.00	00.00
Banana- soy- sesame flour. (B)	67	24.75	08.25
Banana- soy- sesame flour (C)	67	16.25	16.25
Banana- soy- sesame flour (D)	67	08.25	24.25
Banana- sesame flour (E)	67	00.00	33.00

2.2 Chemical analysis

The developed weaning food was analyzed for moisture, protein, fat and ash content according to the methods described in AOAC (1990).

2.3 Statistical analysis

All the data are presented as mean ± SD (standard deviation) of three replicates. Data of Physicochemical properties of weaning food was subjected to analysis of variance and significant difference at 5% level.

3. Results and Discussion

Banana Soy Sesame based weaning food was developed by using the above mentioned (Table 1) formulation. Physico-chemical characteristics were influenced by packaging material, storage period and different proportion of banana, soya and sesame content. The results regarding each physicochemical characteristic are discussed one by one.

Figure 1 and 2 shows the effect of different treatments and storage periods on percent moisture content. Moisture content of weaning foods packed in LDPE and HDPE increases considerably with increases in storage period however the increase in moisture content with the increase in storage period was comparatively less in weaning food packed in HDPE than that of LDPE due to low permeation of air and water. ANOVA at 5% showed significant results.

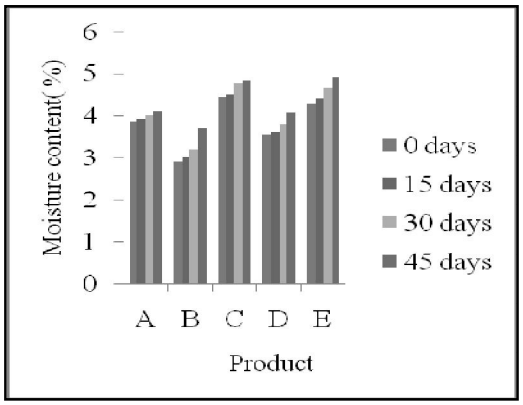

Figure 1: Effect of packaging material (HDPE) and ambient storage on moisture content of weaning foods.

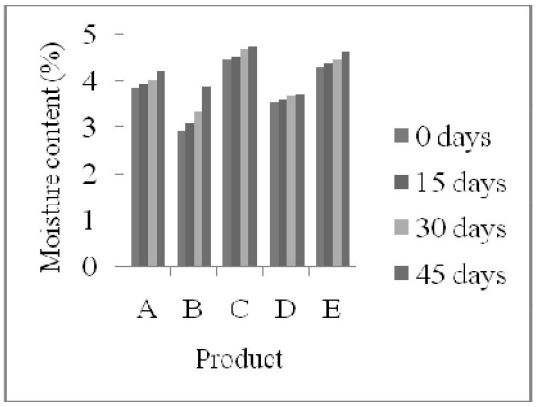

Figure 2: Effect of packaging material (LDPE) and ambient storage on moisture content of weaning foods.

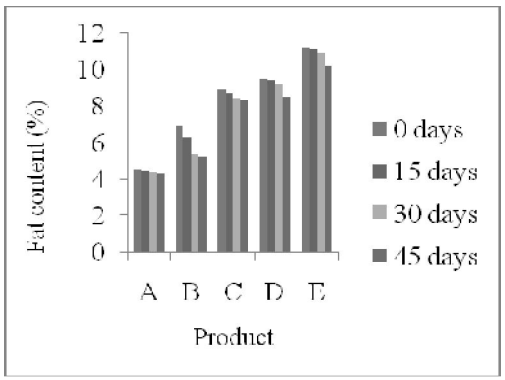

Figure 3: Effect of packaging material (HDPE) and ambient storage on fat content of weaning food.

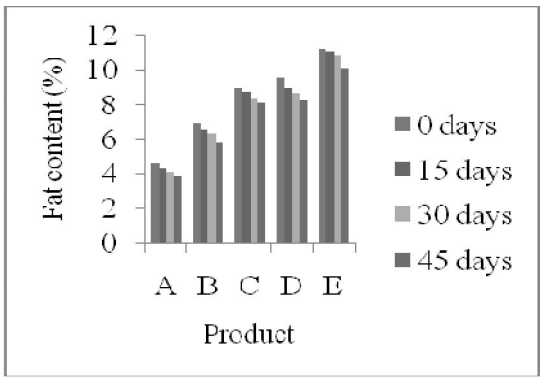

Figure 4: Effect of packaging material (LDPE) and ambient storage on fat content of weaning food.

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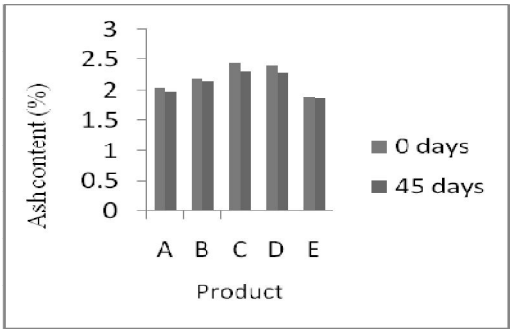

Figure 5: Effect of packaging material (HDPE) and ambient storage on ash content of weaning foods.

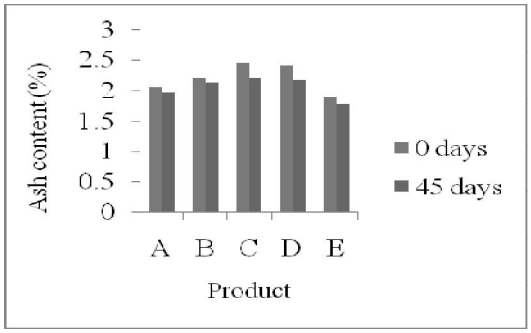

Figure 6: Effect of packaging material (LDPE) and ambient storage on ash content of weaning foods.

Figure 3 and 4 shows the effect of different treatments and storage periods on percent fat content. On critical evaluation of results it was found that fat content of the weaning food was considerably reduced as the proportion of soya is incorporated. Maximum fat content was found in sample B (banana 67% sesame33%) and minimum fat content was found in sample D (banana 67%,soya 33%).The overall results clearly revealed that fat content of weaning foods packed in LDPE and HDPE decreases considerably with the increase in storage period. This decrease in fat content during storage was due to the moisture in weaning food from the atmosphere and due to oxidation of fatty acids resulting in free fatty acid formation. Fat content was decreasing significantly during storage period. Furthermore the HDPE was found a better packaging material as compared to LDPE. ANOVA at 5% showed significant results.

Figure 5 and 6 shows the effect of different treatments and storage periods on ash content. The result showed that the maximum ash content was found in sample C (banana 67% soya 6.25%, sesame 16.25%). The storage period reduced the ash content of weaning food probably due to increase in moisture content with increase in storage period. The packaging material such as LDPE and HDPE had no significant effect on ash content. ANOVA at 5% showed significant results.

4. Conclusion

Following conclusions were drawn from the study-

The moisture content of weaning food packed in LDPE and HDPE increased considerably with increase in storage period. The increase in moisture content with storage time was less in weaning food packed in HDPE.

The fat content of the weaning food increased considerably with increase in contents of sesame and decreased considerably with the increase of soya content and storage period.

The ash content was maximum in sample C (banana67%, soya 16.25% and sesame 16.25%) in fresh condition (2.45%), this shows that soya and sesame both contain minerals in adequate amount. The storage period and packaging material had no significant effect on ash content of weaning food.

The developed weaning food product is found to be satisfactory on the nutritional scale. When compared with the standard nutritional composition of weaning food the product's nutritional composition lies in the range of prescribed standards.

HDPE is found to be a better packaging material when compared to LDPE for packaging the weaning food as the deterioration in the quality of product was found to be less in HDPE packed sample.

5. Acknowledgement

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I want to say sorry and thanks to my beloved wife who is always being patient, supportive and caring during my work.

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